

National Aeronautics and Space Administration



goddardview

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NSSC's Agency Calendar Simplifies Event Tracking

By Christopher Canary

The NASA Shared Services Center's (NSSC) Web-based Agency Calendar is making it easier to track significant events Agency-wide. The calendar has been very well received and the calendar Web page currently registers over 800 visits per month. Some NASA Centers have begun using the calendar source code to create Center-wide calendars for their home Center.

Currently, over 30 sponsoring organizations can add an event in a matter of minutes, and all updates are instantly available to users across the Agency. Points of Contact (POCs) at every sponsor location are responsible for posting events to the Agency Calendar. Most of the POCs have already added events; in fact, sponsors have listed over 200 events for FY2010.

The success of the calendar is due in part to the intuitive design and functionality that mimics the look and feel of a standard Microsoft Outlook calendar. Users can also download events of interest to their personal Microsoft Outlook calendars. Current events include, for example, upcoming launches as well as planning, programming, budgeting and execution events. A wide-range of events are represented and visitors can sort events by category or just view the calendar by month, day, or week, adding to the convenience and ease of use.

Please take an opportunity soon to visit the Agency Calendar online and view what is happening around NASA. The calendar is available on the NASA network by visiting <http://aci.nssc.nasa.gov>.

For any questions or issues regarding the new Agency Calendar, please contact the NSSC Customer Contact Center via e-mail at nssc-contactcenter@nasa.gov or by phone at 877-677-2123. To add events that might be of interest to Headquarters or other NASA Centers, please contact your Center point of contact. ■



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Cover caption: Amber Straughn, Lead Scientist for Education and Public Outreach for the *James Webb Space Telescope*, speaks to guests at "Seeing the First Light," a special event at the Goddard Visitor Center.

Photo credit: NASA/Goddard/Bill Hrybyk

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Deadlines: News items for publication in the Goddard View must be received by noon of the 1st and 3rd Thursday of the month. You may submit contributions to the editor via e-mail at john.m.putman@nasa.gov. Ideas for new stories are welcome but will be published as space allows. All submissions are subject to editing.

James Webb Event Fills Visitor Center

By Lynn Chandler and John Putman

On August 26, over 140 visitors filled the Goddard Visitor Center for "Seeing the First Light," a special night to learn about the *James Webb Space Telescope*. The event opened at 7:00 p.m. but by 6:30 p.m., a line had formed outside.



Photo credit: NASA/Goddard/Bill Hrybyk

Caption: The crowd formed early as eager James Webb fans waited for the Visitor Center doors to open.

Paul Geithner, *James Webb* Observatory Manager, talked about the engineering going into building the *James Webb Space Telescope* and the engineering challenges faced while building such a large telescope.

Amber Straughn, Lead Scientist for *Webb Telescope* Education and Public Outreach, shared details about the successor to the *Hubble Space Telescope*. Straughn presented the amazing science anticipated from *James Webb*. After their presentations, both answered questions from the audience.



Photo credit: NASA/Goddard/Bill Hrybyk

Caption: Paul Geithner and Amber Straughn answer questions from the audience.

Some excellent questions asked included: "Will you be servicing it?" "Is there a plan for a replacement?" "How will you be testing something this big?" "Why are the mirrors gold?" Others questions included, "How do you keep up with the latest technology?" "Has the research already been chosen?"

After the presentations and the question and answer portion, guests watched the "Hubble Gotchu" video. The audience laughed while watching Milky J attempting to save *Hubble*. After watching the video, a young man asked Amber if that was her in the video.

Guests explored hands-on exhibits of *James Webb* hardware and equipment, presented by *James Webb* Optical Physicist Brent Bos. The demonstrations helped guests better understand the technologies of the telescope, including the sunshield, the microshutters, the Integrated Science Instrument Module, and the mirrors.



Photo credit: NASA/Goddard/Bill Hrybyk

Caption: James Webb Optical Physicist Brent Bos describes James Webb hardware to visitors.

Once it became dark outside, guests peered into the night sky by star gazing through more than a dozen telescopes for a perfect evening of star gazing. The telescopes were provided by the Goddard Astronomy Club and the Astronomical Society of Greenbelt. Mike Menzel, *James Webb* Systems Engineer, and Paul Geithner also brought their telescopes.



Photo credit: NASA/Goddard/Bill Hrybyk

Caption: Visitors gaze at the night sky through telescopes provided by local astronomy clubs.

This free, engaging event was part the Goddard Visitor Center Lecture Series. The series is open to the public and shares Goddard's exciting work with our neighbors beyond the gates. ■

NASA's Successful Ice Cloud and Land Elevation Mission Comes to an End

By Sarah DeWitt

One of NASA's orbiting sentinels returned to Earth last month. The Agency's Ice, Cloud, and Land Elevation Satellite (ICESat) completed a productive scientific mission earlier this year. NASA lowered the satellite's orbit last month and then decommissioned the spacecraft in preparation for re-entry. The satellite re-entered Earth's atmosphere and largely burned up on August 30.

ICESat was launched in January 2003, as a three-year mission with a goal of returning science data for five years. It was the first mission of its kind—specifically designed to study Earth's Polar Regions with a space-based laser altimeter called the Geoscience Laser Altimeter System, or GLAS.

ICESat's lasting legacy will be its impact on the understanding of ice sheet and sea ice dynamics. The mission has led to scientific advances in measuring changes in the mass of the Greenland and Antarctic ice sheets, polar sea ice thickness, vegetation-canopy heights, and the heights of clouds and aerosols. Using ICESat data, scientists identified a network of lakes beneath the Antarctic ice sheet. ICESat introduced new capabilities, technology and methods such as the measurement of sea ice freeboard—or the amount of ice and snow that protrudes above the ocean surface—for estimating sea ice thickness.

"ICESat has been a tremendous scientific success," said Jay Zwally, ICESat's project scientist at Goddard Space Flight Center. "It has provided detailed information on how the Earth's polar ice masses are changing with climate warming, as needed for government policy decisions. In particular, ICESat data showed that the Arctic sea ice has been rapidly thinning, which is critical information for revising predictions of how soon the Arctic Ocean might be mostly ice free in summer. It has also shown how much ice is being lost from Greenland and contributing to sea level rise. Thanks to ICESat we now also know that the Antarctic ice sheet is not losing as much ice as some other studies have shown."

After seven years in orbit and 15 laser-operations campaigns, ICESat's science mission ended in February 2010 with the failure of its primary instrument. Because the spacecraft remained in operating condition, NASA's Science Mission Directorate accepted proposals for engineering tests to be performed using ICESat. These tests were completed on June 20. NASA's Earth Science Division then authorized the decommissioning of ICESat. After completing a review of decommissioning activities, the Agency directed that ICESat be decommissioned by this August.

Mission flight controllers began firing ICESat's propulsion system thrusters on June 23 to lower its orbit. Thruster firings ended on July 14, safely reducing the lowest point of the spacecraft's orbit to 125 miles (200 km) above Earth's surface. The orbit naturally decayed. ICESat was successfully decommissioned from operations on August 14. All remaining fuel on the spacecraft was depleted, and atmospheric drag slowly lowered ICESat's orbit until the spacecraft re-entered the Earth's atmosphere.

A statement from the Earth Science Mission Operations office summarized the achievement: "The ICESat mission operations team is commended for its exceptional performance, working tirelessly for the past eleven years (four years of preparation and seven years of operations), overcoming several obstacles in the early years of the mission, and closing out the mission with a flawless series of orbital maneuvers before final decommissioning. The positive control maintained over the mission right to the end shows the quality and effort that went into designing, building, qualifying, launching, and operating a tremendously successful mission such as ICESat."

The vast majority of ICESat burned up in the atmosphere during re-entry. Of the spacecraft's total mass (about 2,000 lbs.), only a small percent reached the Earth's surface. Some pieces of the spacecraft, weighing collectively about 200 pounds, survived re-entry.

ICESat was not designed to perform a controlled re-entry and was unable to provide targeting to a particular location on Earth. ICESat circled the Earth from pole to pole, so surviving debris could have landed almost anywhere on the planet. Due to natural variability in the near-Earth environment, a precise location of where spacecraft debris will re-enter was not forecast. The U.S. Space Surveillance Network closely monitored the orbit of ICESat during its final days and continued to issue periodic predictions of re-entry time and location. On Monday, August 30, at approximately 5 a.m. EDT, NASA's Orbital Debris Program Office reported that debris from the ICESat spacecraft fell to Earth in the Barents Sea.

"The ICESat team has done a marvelous job to ensure that the spacecraft is removed as a hazard to other spacecraft and as a potential source of future orbital debris," said Nicholas L. Johnson, NASA Chief Scientist for Orbital Debris at NASA's Johnson Space Center in Houston.

Despite the end of ICESat's mission, NASA's observations of Earth's Polar Regions continue. In anticipation of the ICESat mission coming to an end, and in accordance with the National Research Council's Decadal Survey of future NASA Earth science missions, NASA has begun development of ICESat-2, planned for launch in 2015. ICESat-2 will continue the science legacy of its predecessor, and improve our understanding of Earth's dynamic Polar Regions with new and advanced technology.

The Operation Ice Bridge airborne mission, started in 2009, is the largest airborne survey of Earth's polar ice ever flown. The mission is designed to partially fill the data gap between the ICESat and ICESat-2 satellite missions. For the next five years, instruments on NASA aircraft will target areas of rapid change to yield an extraordinary 3-D view of Arctic and Antarctic ice sheets, ice shelves, and sea ice. Targeted information from aircraft, combined with the broad and consistent coverage from satellites contribute to a more complete understanding of Earth's climate, helping scientists make better predictions of what the future might hold. ■

NASA's Magnetospheric Mission Passes Major Milestone

By Susan Hendrix

The universe remains a mysterious place that scientists know very little about. A new NASA Solar Terrestrial Probe mission, however, will shed light on one especially puzzling event called magnetic reconnection. It occurs when magnetic lines of force cross, cancel, and reconnect releasing magnetic energy in the form of heat and charged-particle kinetic energy.

On the Sun, magnetic reconnection causes solar flares more powerful than several atomic bombs. In Earth's atmosphere, magnetic reconnection dispenses magnetic storms and auroras, and in laboratories on Earth, it can cause big problems in fusion reactors.

Although the study of magnetic reconnection dates back to the 1950s, and despite numerous scientific papers addressing this perplexing issue, scientists still cannot agree on one accepted model.

In 2014, NASA is scheduled to launch a satellite that will greatly increase our understanding of this phenomenon when it launches the Magnetospheric Multiscale (MMS) mission, a suite of four identical spacecraft that will study magnetic reconnection in the best possible laboratory—the Earth's magnetosphere. The spacecraft will obtain measurements necessary to test prevailing theories as to how reconnection is enabled and how it progresses.

Recently, NASA and members of an independent review board painstakingly reviewed every aspect of the MMS mission, and successfully completed the mission's critical design review. This technical review is held to ensure that a mission can proceed into fabrication, demonstration, and test, and can meet stated performance requirements of cost, schedule, risk, and other system constraints.

According to MMS Deputy Project Scientist, Mark Adrian of Goddard, "This is the last hurdle before the spacecraft and instrument teams begin to build actual flight hardware."

MMS was approved for implementation in June 2009 following a successful Preliminary Design Review in May 2009.

Dr. James L. Burch of the Southwest Research Institute in San Antonio, Texas will lead the MMS Science Team. According to Burch, "Magnetic reconnection is a fundamental physical process that occurs throughout the

universe. MMS will enable us to study this dynamic process in the near-Earth space environment, where it transfers energy from the solar wind to the magnetosphere and drives disturbances known as space weather."

Goddard is the lead Center for the mission. Engineers here will perform the required environmental testing, build the spacecraft, integrate all four sets of instruments into the MMS satellites, support launch vehicle integration and operations, and develop the Mission Operations Center to monitor and control the spacecraft.

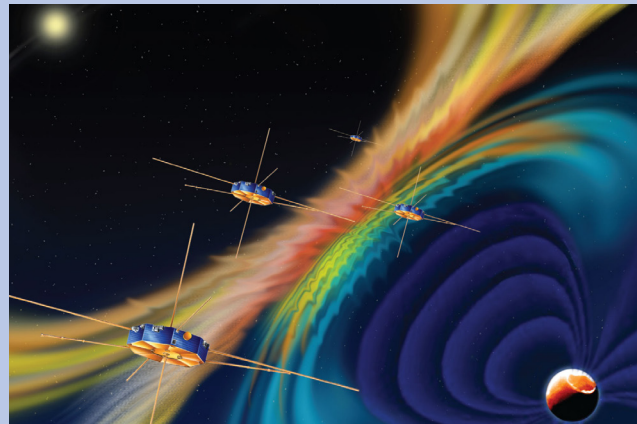


Image credit: Southwest Research Institute

Caption: Artist conception of the four Magnetospheric Multiscale (MMS) spacecraft investigating magnetic reconnection within Earth's magnetic field (magnetosphere).

MMS will carry identical suites of plasma analyzers, energetic particle detectors, magnetometers, electric field instruments, as well as a device to prevent spacecraft charging from interfering with the highly sensitive measurements required in and around the diffusion regions.

Scientists and engineers at Goddard have designed and will build one of the instruments—the Fast Plasma Instrument—which will measure ion and electron distributions and the electric and magnetic fields with astronomically high millisecond time resolution and accuracy.

Currently, MMS is scheduled to launch in August 2014 from Cape Canaveral Air Force Station, Fla. aboard an Atlas V rocket.

For more information about the MMS mission and science, visit: <http://stp.gsfc.nasa.gov/missions/mms/mms.htm>. ■

NASA Earth Scientists Advance Space Archaeology

By Christina Coleman and Melissa Quijada

Two NASA Earth scientists have traded in their air-conditioned offices for the sweltering fields of central Turkey. Toiling nine or more hours per day, seven days a week, they walk up to 10 miles a day searching ancient Turkey archaeological grounds for bone fragments, pottery, and tombs. But they aren't using shovels, picks, and brushes to do the job.

Instead, scientists Compton Tucker from Goddard and Joe Nigro, who works at Goddard through Science Systems and Application Inc., are combining NASA satellite data and ground penetrating radar (GPR) technology to map and protect areas of archaeological interest for an excavation project, located at the famed spot where Alexander the Great cut fabled King Midas' Gordian knot. In the past, NASA radar has been used on satellites and spacecraft to detect ice deposits and to explore deep canyons on the Moon's surface.

"The radar assists in excavation by helping archaeologists identify areas where there are features under the ground, but GPR is also used as a non-invasive technique so that the site doesn't have to be excavated," said Joe Nigro, a geographic information systems specialist, and archaeologist by training.

After winning a NASA Research Opportunities in Space and Earth Sciences (ROSES) grant last year, the two men will join about 150 others affiliated with the Turkish Antiquity Service, the University of North Carolina, and the University of Pennsylvania's Museum of Archaeology and Anthropology's Gordian Archaeological Project. Tucker, Nigro, and Jennie Sturm, a radar specialist from TAG Research, spent three weeks at the site compiling information about human settlement, artifacts, and agriculture, using tools that traditional archaeologists usually don't have access to.

"Archaeology is inherently labor intensive, and thus expensive in terms of time and money, so we rarely get to excavate an entire site. GPR and other geophysical techniques allow us to collect data on parts of the site we might otherwise not be able to investigate," said Philip Mink II, a GIS manager and staff archaeologist from the University of Kentucky's Department of Anthropology. "These investigations may locate archaeological features such as houses, tombs, burials, trash and storage pits, and ceramic firing areas that can be targeted for excavation given the limited money and time field archaeologists often face."

Mink, who has no affiliation with the Gordian project, believes that GPR is one of the most diverse and useful tools of all geophysical techniques used in archaeology.

The scientists spend hours dragging the radar device, which looks similar to a small lawn mower, across the fields of Gordion. Vital to archaeological excavation, GPR sends pulses of microwave energy underground. The energy bounces off buried objects and layers, and scientists can use the pattern of radar echoes received on the surface to create a subterranean snapshot.



Caption: NASA Earth scientist Compton Tucker and Jennie Sturm, a radar specialist from TAG Research, survey the grounds with radar technology.

Photo credit: NASA/Goddard/Joe Nigro

"It looks like a box, you drag it across the ground and, depending on the wavelength, it dictates how deep it goes. The lower the frequency, the deeper the penetration," Nigro said.

State-of-the-art software will be used to process the 3D radar data and construct virtual representations of the buried features. According to Mink, the amount of data collected per unit area surveyed by GPR definitely surpasses the other geophysical techniques because it is collecting data constantly at a variety of depths.

Nigro, who used the technology in graduate school to survey Civil War cemeteries and battlefields, and Tucker, who has participated in GPR surveys at other archaeological sites in Turkey, hope to use the data to pinpoint the position of tombs and artifacts prior to excavation, protecting them from both, natural elements, and looting in a country with a large market for illegal antiquities.

"One of the reasons we do the work, and are very passionate about it, is that we feel like what we're doing is fighting against looters and plunderers who would find the more valuable things, trash everything else, and send them to Switzerland where anyone can buy them," Tucker said.

"The context of how these objects were buried is completely lost, and instead they just become some sort of trophy on someone's mantle," he added.

GPR also allows the scientist to carry out their work while remaining culturally sensitive to the land, preventing the disturbance of burial sites or relics from the past; activity that may be considered taboo to some indigenous groups.

For years, archaeologists have collected incomplete spatial information about the Gordian site. Previous excavations have failed to produce exact referencing data, a major obstacle to the spatial and chronological analysis of the excavated material. In addition to the GPR work, Tucker and Nigro will create

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a multi-layer, three-dimensional common mapping system for the site in a geographic information system (GIS).

"This site level data on buried archaeological phenomena is a luxury many modern archaeologists often don't get. We often test hypotheses and make interpretations based on the limited data we are able to excavate," Mink said about why Tucker and Nigro's field work is significant. "Having GPR and other geophysical data that shows other archaeological features throughout the entire site area allow the archaeologists to look for patterns across the site."

From satellite images and digital elevation data, the team of space archaeologists will anchor and standardize reference points using Global Positioning Systems (GPS), first developed by the U.S. military. They will compare land measurements with computed GPS data to correctly locate archaeological features by creating a network of points partially based on existing maps. Aerial and balloon photography from previous years will also serve to better locate trenches and structures from various excavation seasons.

In addition, the team is also using remote sensing technology to detect the dynamic changes in the environment caused by both natural processes and human practices, such as climate and agriculture. These environmental changes may be hidden to the naked eye.

"We don't want to be limited by our eyes, so we use electromagnetic spectrum radar to look beneath the surface," Tucker said.

To observe land use and land cover change in Central Turkey from 1950 to 2010, the project will also examine NASA Landsat satellite images. The imagery will be processed and analyzed to map natural and human-induced vegetation changes. For each time period, the Landsat data will be categorically divided by areas with variations of water, forest, pastures, and cultivation. Aside from contributing to the continued preservation of Turkey's cultural legacy, the data from these NASA images will further promote sustainable development, according to Tucker and Nigro.

"It is important because we can figure out an excavation or preservation strategy based on our work," Nigro said. "The agricultural change aspect of our study may help other archaeologists in developing and assessing a methodology and protection plan for preserving their sites."

Both men anticipate the techniques developed in the Gordion Project will be applicable to many other archaeological sites with similar mapping problems, such as the Hassanlu site in Iran and Tikal in Guatemala.

"What these instruments do is expand our ability to study things," Tucker said. "This is something NASA does to make our technology available to other people." ■

Lunar Spacecraft Completes Exploration Mission Phase

By Michael Braukus and Nancy N. Jones

NASA's *Lunar Reconnaissance Orbiter* (LRO) completed the exploration phase of its mission on Sept. 16, after a number of successes that transformed our understanding of Earth's nearest neighbor.

LRO completed a one-year exploration mission in a polar orbit approximately 31 miles above the Moon's surface. It produced a comprehensive map of the lunar surface in unprecedented detail; searched for resources and safe landing sites for potential future missions to the Moon; and measured lunar temperatures and radiation levels.

The mission is turning its attention from exploration objectives to scientific research, as program management moves from NASA's Exploration Systems Mission Directorate to the Science Mission Directorate.

"LRO has been an outstanding success. The spacecraft has performed brilliantly," said Doug Cooke, associate administrator of the Exploration Systems Mission Directorate. "LRO's science and engineering teams achieved all of the mission's objectives, and the incredible data LRO gathered will provide discoveries about the Moon for years to come."

The LRO team will continue to send data gathered during the last year to the Planetary Data System, which archives and distributes scientific information from NASA planetary missions, astronomical observations and laboratory measurements.

By the time LRO achieves full mission success in March, and its data is processed and released to the scientific community, it will have sent more information to the Planetary Data System than all other previous planetary missions combined. During its new phase of discovery, LRO will continue to map the Moon for two to four more years.

"The official start of LRO's science phase should write a new and intriguing chapter in lunar research," said Ed Weiler, Associate Administrator for the Science Mission Directorate. "This mission is one more asset added to NASA's vast science portfolio."

Results from the mission include: new observations of the *Apollo* landing sites; indications that permanently shadowed and nearby regions may harbor water and hydrogen, observations that large areas in the permanently shadowed regions are colder than Pluto, detailed information about lunar terrain, and the first evidence of a globally distributed population of thrust faults that indicates the Moon has recently contracted and may still be shrinking. LRO also took high resolution pictures of the Lunokhod 1 rover that had been lost for almost 40 years.

Goddard Space Flight Center built and manages LRO for the Exploration Systems Mission Directorate. For more information about LRO, visit: <http://www.nasa.gov/lro> ■

Goddard Scientists Explore Desert RATS

By Nancy N. Jones

What's it like to explore the surfaces of other planets? Two scientists from Goddard are finding out by taking part in the annual Desert Research and Technology Studies, or Desert RATS, project, here on Earth. They will travel to the Arizona desert, a field location chosen to simulate possible sites of future planetary exploration missions. It's a cheaper, easier way for NASA to test equipment and train crews, and those who participate learn a lot about what will or won't work during real flight missions.

The Desert RATS project was developed as a means of field testing space-suits, rovers, tools, and other hardware. During the field campaign, engineers and field geologists go to Arizona to conduct tests on multiple exploration assets currently under development by NASA, such as new rovers, robots, suits, and habitats. These new technologies are evaluated during several traverses across the desert. As a result, engineers and scientists can evaluate which hardware and techniques are and are not effective at enabling scientific work during a traverse, and therefore which might be useful in future exploration. The Desert RATS 2010 mission involves field testing of two space exploration vehicles, which could, in the future, allow astronauts to spend two or more weeks living, working, and traveling across different planetary surfaces. This year, astronauts will use two such vehicles to explore a lava flow in Arizona and test data-collection methods, communications protocols, mission operations, and advanced technology during week-long traverses, which run from August 31–September 13.

Jake Bleacher, a planetary geologist at Goddard's Solar System Exploration Division, will be part of the rover crew. "This is my second year as a crew member in the Space Exploration Vehicle (SEV)," said Bleacher. "Each rover crew is composed of a flight-experienced astronaut and a field-experienced geologist so that we might be able to provide feedback to the engineering teams as to how their equipment handles with respect to spaceflight conditions and field science work."

James Rice, another planetary field geologist from the Division, will be part of the second rover crew. "I officially became involved in Desert RATS three years ago, working as both a field geologist and a member of the science back room team. For last year's field test, I was the lead science Principal Investigator for planning and directing the crew rover traverses and space-walk activities. My previous duties and responsibilities on the project have been to aid in developing a well-trained geological science support team and procedures for field operations, data collection, and analysis; and to develop methodologies for constructing, executing, and modifying traverse/space-walk plans, in modalities where reconnaissance data is or is not available and when communications are continuous or intermittent."

This year the campaign highlights how to best use two rovers and two crews at the same time—something that has never been done before. The team will look at how different communication scenarios affect scientific productivity. For instance, is it better for the crew to be in constant communication with Mission Control and a science back room, or is the crew just as effective if

they only communicate with those teams twice a day? Because the geology in the study areas is already well understood, they can compare their Desert RATS investigation results with previous work to see how well they can do similar work using the new NASA technologies.

The NASA hardware being demonstrated for the 2010 mission includes Space Exploration Vehicles—a pair of rovers that astronauts will live in for 7 days at a time; Habitat Demonstration Unit/Pressurized Excursion Module—a simulated habitat where the rovers can dock to allow the crew enough room to perform experiments or deal with medical issues; two heavy-lift rover platforms—called All Terrain Hex-Legged Extra-Terrestrial Explorers (Tri-ATHLETE)—that allow the habitat, or other large items, to go where the action is; Portable Communications Terminals—a rapidly deployable communications station; Centaur 2—a possible four-wheeled transportation method for NASA Robonaut 2; Portable Utility Pallets (PUP) for short—mobile charging stations for equipment; and a suite of new geology sample-collection tools, including a self-contained GeoLab glove box for conducting in-field analysis of various collected rock samples.

The centerpiece of these tests over the past three years has been a prototype planetary rover called the Space Exploration Vehicle (SEV). During traverses, investigations can be conducted from within the cabin environment using a suite of cameras and other sensors. The crew can also conduct spacewalks facilitated by the innovative "suitport" hatches that allow relatively quick egress/ingress, greatly increasing the flexibility of spacewalks.



Caption: The ATHLETE, PEM, and SEV all together at the start of Mission Day 9.

Photo credit: NASA/James Blair

In the future, astronauts will need surface mobility to explore multiple sites across the lunar and Martian surfaces. In the SEV surface concept, the small, pressurized cabin is mounted on a wheeled chassis that would enable mobile exploration. These two components could be delivered to the planetary surface pre-integrated or as separate elements. This SEV can provide the astronauts' main mode of transportation, and, unlike the unpressurized *Apollo* lunar rover, also allow them to work on long excursions without the restrictions imposed by spacesuits.

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So what's a day like in the rover? Bleacher explained, "Well, the crew wakes up and has breakfast. Then we go through a series of briefings with Mission Control and the science team to go over our plans for the day, how they might have changed from the day before. And we make sure that we know our specific objectives and points that we must reach by the end of the day. We then begin driving the SEV along our planned route, composed of several navigation points and stations where we might conduct spacewalks. During a spacewalk, we are able to exit the rover via the suitports, a new design that keeps the suit on the outside of the rover, as well as the dust that might be clinging to it. The suitport is a technology that we tested extensively in last year's field test.

"During a spacewalk, we are able to collect scientific samples and conduct basic field geology analyses of the local terrain. By moving from station to station with the SEV, we are able to build a geologic understanding of the region. Unlike *Apollo*, the SEV enables the crew to enter into the rover after a spacewalk and rest in a comfortable shirtsleeve environment between stops. At the end of the day, we park the rover for the evening and go through a series of briefings to review our progress and help the science team plan for the next day. After that, the crew has time to eat, exercise, and work out our notes for the day, and we have some personal time before heading to bed. All in all, we don't have a large amount of space, but in general it is a comfy environment with all the accommodations that we need. I've certainly been in harsher living conditions while conducting field work for my own research."



Photo credit: NASA/James Blair

Caption: Crew member Dr. Jacob Bleacher takes a break to read. The stowage lockers are used for clothing and other items needed by the crew for the week.

Goddard has traditionally had little to no involvement in Desert RATS. In the last three years, however, the project has solicited scientists' input about the use of the hardware components and feedback on the surface systems assets. Specifically, field geologists provide input on whether such assets hinder the ability of scientists to carry out their jobs on a planetary surface and, more importantly, how those capabilities might be improved. As such, Desert RATS now represents not only a multicenter engineering test, but a true combination of exploration and science efforts to develop the best surface systems hardware, software, and operational protocols.

"The inclusion of significant scientist input over the last three field tests opens the door to a stronger Goddard presence, which is demonstrated by the fact that this year, Johnson Space Center has filled 50 percent of the geology crew positions with Goddard scientists," added Rice.

"For me, the Desert RATS mission encompasses what it means to work for NASA: you just can't do this anywhere else but NASA," said Bleacher. "Ultimately, it is very rewarding to know that we are building new technologies and developing the procedures and techniques for using them that will enable humankind to expand our presence and to explore the universe in which we live."

Rice added, "It is a distinct honor and privilege to be part of the formative stages in helping NASA develop and test concepts for a new generation of space exploration vehicles. These space exploration vehicle concepts will help future astronauts explore various planetary surfaces ranging from near-Earth asteroids, the Moon, and/or Mars; build a long-term space presence; and conduct a wealth of science experiments. I have always been interested in becoming an astronaut and long ago decided that if I wasn't fortunate enough to be selected as an astronaut then I wanted to devote my energies to training the astronauts in the principles, methods, and techniques of field geology, and helping to develop and test concepts and equipment for future manned planetary surface missions. After all, it is the next best thing to being there. But obviously I would gather go in person. My rock hammer and toothbrush are always ready to roll!"

Desert RATS is sponsored by NASA's Exploration Systems Mission Directorate in Washington D.C. and is managed by Johnson Space Center.

For more information on Desert RATS, visit:

http://www.nasa.gov/exploration/analogs/desert_rats.html. ■

OutsideGoddard: That Disney Magic

By Elizabeth M. Jarrell

Bernie Edwards, a communications engineer for the Constellation Program Office, has always liked all things Disney. The son of a military father, he grew up all over the world but summered at his grandparent's chicken farm located about two hours north of Walt Disney World near Orlando, Florida.

"My first job in life was collecting dead chickens every morning," says Bernie, "Instead of going to the movies on the weekend or to the beach, we'd go to Disney World. A vacation from collecting dead chickens made going to Disney World all the more fun." It's no wonder Bernie went from liking all things Disney to loving all things Disney. In addition, all that hard work inspired Bernie to further his education so that he would not have to spend the rest of his life picking up dead chickens every day.

From childhood until now, Bernie explains that "I never stopped visiting the Disney parks. I have visited the parks in California, Florida, and even Paris a total of more than 100 times, although most of my trips were only for one day." Bernie further explains that Disney has parks in California, Florida, Paris, Tokyo, and Hong Kong, and is building another in Shanghai, China. Disney, in association with Best Friends Pet Care, is even opening a luxury pet resort at Disney World, which will be in addition to their already superior, non-exotic pet boarding facility. He should know. Bernie, the father of two, had the privilege of being appointed to the 2010 Walt Disney World Moms Panel effective January 1, 2010. The 21 new panelists were selected from approximately 20,000 applicants.



Caption: Bernie poses with his employers.

The Walt Disney World Moms Panel was established in 2008. Walt Disney World Resort's Social Media Manager, Laura Spencer, describes this panel as "an online question-and-answer venue that serves as a free resource for families looking for a touch of pixie dust to add to their Disney vacation. The panel is led by everyday parents who have mastered the art of planning a vacation for their own families and are excited to share their pearls of wisdom with others."

Bernie notes that "Disney wanted parents to answer the questions of other parents." Some panelists specialize in the Disney resorts while others focus on the Disney Cruises Line or Adventures by Disney vacations, which involve organized tours of interesting places both within the U.S. and abroad. The panel includes a total of 43 members of which eight are dads. As Bernie notes, "even Mothers Against Drunk Driving includes fathers."

All panelists attend five days of training at Disney World on topics including using the computer systems to answer questions and public relations techniques. As a panelist, Bernie spends about an hour a week answering at least eight questions. He selects the questions he wants to answer and prefers those from military families, although on occasion individuals have directed questions specifically to him. His specialty is planning vacations at Walt Disney World, which is not a surprise given that the Magic Kingdom theme park at Disney World, with the theme of fantasy, is his favorite park. Bernie also notes that Walt Disney World, at 43 square miles, with four theme parks, two water parks, two entertainment and shopping districts, golf courses, 17 themed hotels, and over 200 places to eat, is the physical size of San Francisco.

Bernie says that "typical questions are 'I'm overwhelmed, where do I start planning my family vacation?' or 'How do I make a celebration vacation extra special?'" The most interesting question he has heard was from someone who wanted to know if they could bring their hermit crab to the resort. Bernie diplomatically notes that "they were discouraged from bringing their hermit crab."

Panelists are not paid. However, panelists who serve for a full year receive one free trip for their family including travel, hotel, and food. Those who serve only a quarter of the year, including Bernie, receive free park tickets for the family for one visit. According to Bernie, "I applied to the panel because I love Disney and I love helping people plan Disney vacations." Most continue on the panel the next year although the few who do not often become travel agents specializing in Disney vacations.

Bernie explains what attracts him to the Disney magic as follows: "It's the people. What makes Disney World special are the people who work there who are called Cast Members. Walt Disney said that the employees were on stage and as such should interact with the guests. Also, the service. Even my kids recognize that the quality of service and cordial atmosphere are just really high."

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OutsideGoddard: That Disney Magic

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By way of further explanation, Bernie notes that there are two kinds of Walt Disney characters. The first kind is "fur characters" such as Mickey and Minnie Mouse and the Big Bad Wolf. These characters are in costume and do not talk. Bernie says that his favorite fur character is "Mickey Mouse because I love his good natured attitude and friendliness. He doesn't take himself too seriously. I'm still a kid at heart I guess."

The second type is "face characters" like the Disney Princesses and Peter Pan. These characters look human and are encouraged to speak to and interact with the guests. Bernie explains that his favorite face character is The Mad Hatter because "he's pretty crazy. I like his antics. He's entertaining."



Caption: Bernie and his family get into the spirit of things.

Even Bernie's kids get in on the act. Bernie chuckles that "my kids think I'm in love with Minnie Mouse. But my wife is not jealous. My five year old, when he sees Mickey Mouse, will tell him I'm in love with Minnie Mouse." Although Bernie takes his family on a Disney vacation once or twice a year, he does not collect Disney paraphernalia. He has a lot of Disney shirts and his kids have many Disney toys, but the only Disney object in their home is a two foot statue of Mickey Mouse dressed as The Sorcerer's apprentice.

However, come October, Bernie and his family are taking their next family trip—to Walt Disney World, of course. ■

"Can the Art" Contest Links Space and Recycling

By Darlene E. Squibb

The Medical and Environmental Management Division, Code 250, kept kids busy this summer by sponsoring a "Can the Art" contest over the summer for children or relatives of employees. The contest sought children's art work that brought together the themes of NASA's space program and recycling on Earth. The winning artwork will be scanned and placed as a wrapping around a recycling can known as a "canable."

There were three eligible age groups of 5 to 7, 8 to 11, and 12 to 16. While the contest started at the end of June, excitement built until the due date of August 10. Making it into the final countdown were four posters in the 5 to 7 age category and seven in the 8 to 11 category. Having no entries in the older category, two were chosen from the 8 to 11 age group. The final winners were the children of Leonard Garcia (Code 605), Annamarie, age 7; Randy Hedgeland (Code 546), Sydney, age 9; and Chris Helser (Code 803.2 of Wallops), Abby, Age 10.

All the artwork was very creative and interesting. The judges enjoyed the perspective of each of the drawings. They will all be celebrated at an America Recycles Day event tentatively scheduled to be held on November 2 in the Building 28 atrium. Look for the final "canables" to be placed in visible places around Center this fall. The Wallops winner will go on a "canable" at Wallops. Congratulations to everyone who contributed to the submissions.

You can see the winners and all of the artwork on Goddard's recycling Web site: <http://recycle.gsfc.nasa.gov>. ■



Caption: One of the winning submissions from Sydney Hedgeland.

Earth Science Picture of the Day Celebrates 10th Birthday

By Daniel Pendick

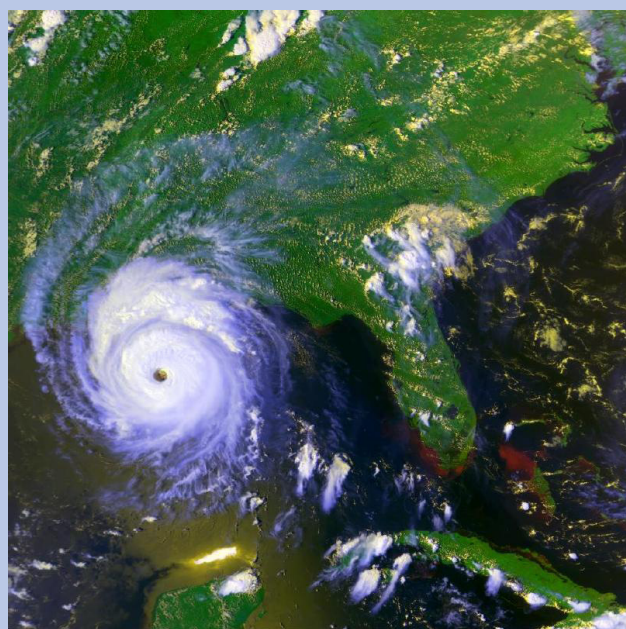
Does your heart palpitate when perusing bathymetry of the Los Angeles Margin? Do you find satellite imagery of the Aral Sea arresting? Are you captivated by concretions on the Athabasca River? Do you hyperventilate over Kelvin-Helmholtz clouds? Or how about some nice wildflower snapshots or a warm red sunset?

All this and more has graced the Web for the past decade since the "Earth science image of the day," or EPOD, went live. Goddard snowpack scientist Jim Foster has been at the reins since the beginning, making sure Earth scientists, outdoorsy shutterbugs, and accidental ecotourists have a platform to share their images with the world.

Foster's bread and butter—80 percent of his paid time—is devoted to snowpack hydrology. "I'm in the Hydrological Science Branch, and my research deals with snow hydrology, also related to snow and climate," he explains. "I'm involved in projects trying to better derive how much water is stored in snowpack—seasonal snow not glaciers."

The other 20 percent of his time, funded through the NASA Earth Observatory, is devoted to disseminating an eclectic parade of Earth-related images, mostly shot by amateurs. The coverage extends from the wispy tops of the atmosphere to the depths of the oceans and virtually everything in between.

EPOD's first post went live on September 8, 2000. The image was a satellite view of Hurricane Andrew churning in the Gulf of Mexico, with a caption commemorating the September 8, 1900 storm that devastated Galveston, Texas, and killed more than 6,000 people.



Caption: EPOD's first post, on September 8, 2000, featured a satellite view of Hurricane Andrew in the Gulf of Mexico, marking the 100-year anniversary of the storm that devastated Galveston, Texas.

The project has its roots in an education and public outreach project at Goddard called Science Question of the Week. Foster fielded Earth science queries from students. Meanwhile, in 1995, two astronomers—Goddard's Jerry Bonnell and Michigan Technological University's Robert Nemiroff—had founded the wildly popular Astronomy Picture of the Day (APOD). In early 2000, Cindy Howell in the Public Affairs Office at Goddard suggested that Foster start a daily Earth science image site, modeled on APOD. All it took was a single vowel change to create EPOD, using seed money from the (now defunct) Director's Discretionary Fund.

Foster gathered photos, wrote the captions, and compiled Web links. Martin Ruzek, with the Universities Space Research Association (USRA), helped out in the early years and made sure the daily photos were up and running (Ruzek later left the project). USRA, a private, nonprofit consortium of 105 universities offering advanced degrees in space- and aeronautics-related disciplines, still hosts the Web site on its server.

The call for images took a few months to see results, but now there is no shortage of photos to choose from. "We've received contributions from each continent," Foster says. "Sometimes they're scientists, sometimes they are people who just have an interest in science, and sometimes they are just folks who didn't have an interest in science but who had a camera and saw something that captured them." Each EPOD entry includes a caption, Web links, time and date when the photo was taken, and map coordinates.

USRA's Stacy Bowles handles the technical aspects of the site and runs the recently added EPOD Facebook page. And a former marketing and publications specialist in Seattle, Stu Witmer, works on EPOD as an unpaid volunteer. He provides grammar checks, proofreading, and other valuable support.

In the beginning, EPOD ran only on weekdays. But now it is daily. Day after day for most of the past decade, the ravenous mouth of EPOD had to be fed with a new image and associated information and Web links. And through rain, hail, sleet, or snowpack, Foster has delivered. Vacations and work travel are no exceptions. "I really have to have a queue built up before I leave," he says.

So EPOD is Foster's joy as well as his jailor. And it makes him one of those unsung heroes of science on the Web—the enthusiasts who just do what they do, day after day, usually for not much more than the satisfaction of doing it.

So keep Jim Foster busy and send in your earthly images. And if you someday feel a craving for a photograph of Kelvin-Helmholtz clouds over the Gulf of Maine, you know where to go. ■

Photo credit: NASA/Goddard/Bill Hyobik